

EXPOSURE VARIABILITY AND BEHAVIOUR OF INDOOR AND OUTDOOR AIR POLLUTANTS IN PRIMARY SCHOOLS IN THE UNITED KINGDOM

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Background and Aims: Current evidence suggests that exposure to common indoor air pollutants is associated with adverse health effects in children. This study was conducted to examine air quality in four primary schools in southern England, in order to establish daily, weekly and seasonal variability of pollutant concentrations within and between the schools, and to understand the behaviour of common indoor and outdoor air pollutants.

Methods: Four primary schools were selected for the study, in urban, suburban and rural environments with diverse size and socioeconomic backgrounds. Air quality monitoring was conducted in three rounds (autumn, winter, summer) during the academic year 2009-2010. Each round involved monitoring continuously for one week in four locations of typical children's exposure: generally three indoors and one outdoors. Measurements were carried out for particulate matter count for size range 0.5-5.0 μ m (PM_{0.5-5.0}), carbon dioxide (CO₂), carbon monoxide (CO), and nitrogen dioxide (NO₂).

Results: Findings revealed great variability in PM_{0.5-5.0} concentrations during the week and between rounds of measurements within each school, and between schools. CO concentrations were greatly variable for the suburban and rural schools. Little variability was seen for NO₂ concentrations. CO₂ levels differed during the day and between days and rounds in each school, and between schools, depending on the daily activity patterns of children and practice of ventilation. Linear regression models predicted indoor levels for PM_{0.5-5.0}, CO and NO₂, based on contribution of outdoor concentrations to the same pollutant, ventilation measured by CO₂ concentrations and weather variables.

Conclusions: Study findings showed variability in pollutant exposure levels between locations, days and seasons in each school, and between all four schools. These differences related to school building design and location, ventilation practices and children's daily activities. These findings support the need for developing methodology for personal exposure assessment to air pollutants among school children.